



HAND-HELD ~~HAND~~ VACUUM CLEANER INCLUDING A BUILT-IN HOSE
AND AN ADJUSTABLE WIDTH NOZZLE

BACKGROUND OF THE INVENTION

(a) Field of the Invention

The present invention is related to a hand-held ~~hand~~ vacuum cleaner, and more particularly to one provided with adjustable nozzle width and a retractable hose hidden in a dust receiver that ~~and~~ automatically extends during ~~ejects in~~ use.

(b) Description of the Prior Art:

Hand-held ~~Hand~~ vacuum cleaners generally available in the market have a fixed nozzle that prevents ~~from~~ adjustment of ~~for~~ its width; therefore, specific external accessories including flexible hoses ~~hose~~, wider nozzles ~~nozzle~~ or nozzles having different shapes ~~nozzle in other dimensions~~ are required to extend the hose and/or change the width ~~wide~~ of the nozzle. When not used, those external accessories must be separately stored and retrieved ~~fetched out~~ for assembly when the hand-held ~~hand~~ vacuum cleaner is needed. While time is wasted on the assembly, those external accessories are also vulnerable to loss or damage. Therefore, the separate design of the external accessories is not very handy for the use of the hand-held ~~hand~~ vacuum cleaner.

SUMMARY OF THE INVENTION

The primary purpose of the present disclosure ~~invention~~ is to provide a hand-held ~~hand~~ vacuum cleaner integrated with an adjustable nozzle width and a retractable hose. Another purpose ~~of the present invention~~ is to provide a hand-held ~~hand~~ vacuum cleaner integrated with a nozzle having adjustable ~~nozzle~~ width. To achieve this ~~the~~ purpose, ~~on~~ one side or ~~on~~ both sides of the principle nozzle are ~~is or~~ provided with one expandable ~~expanded~~ nozzle or two expandable ~~expanded~~ nozzles. Each expandable ~~expanded~~ nozzle is comprised of a slider and one or more than one connectors. When the slider retreats to engage to the connector, the

vacuum cleaner operates with its original nozzle width; when required, both of the slider and the connector can expand outward to allow a wider nozzle for a larger vacuum area providing for time saving, easier operation and a significant increase of improved efficiency to make sure that ~~the~~ built-in accessories will not get lost and to eliminate the need for separate storage of external accessories.

Another purpose ~~yet of the present invention~~ is to provide a hand-held ~~hand~~ vacuum cleaner with adjustable nozzle width. To achieve this ~~the~~ purpose, the slider may be adapted to lock to one or more than one connectors ~~connector~~ by means of matching hooks ~~hookers~~ to ensure that the slider and the connector will not ~~won't~~ separate from each other when the slider is expanded.

Another purpose ~~yet of the present invention~~ is to ~~to~~ [[t]] provide a hand-held ~~hand~~ vacuum cleaner with a retractable hose. To achieve this ~~the~~ purpose, an inner sleeve is provided in the dust receiver of the vacuum cleaner, and the primary nozzle is adapted with a built-in hose. The hose is flexible so as to be compressed to be stored in the inner sleeve. The flexible hose will be ejected out of the sleeve for a doubled length if required to facilitate cleaning where the area to be cleaned prevents direct access, such as a ~~the~~ drawer, slit or groove.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded view of a first preferred ~~embodiment of a hand-held vacuum cleaner of the present invention.~~

Fig. 2 is a sectional view of an assembly of the first preferred ~~embodiment of the present invention.~~

Fig. 3 is a sectional view showing a nozzle in its narrow status of the first preferred ~~embodiment of the present invention.~~

Fig. 4 is a sectional view of a dust receiver of the first preferred ~~embodiment of the present invention.~~

Fig. 5 is a perspective view of an expanded nozzle of the first preferred embodiment ~~of the present invention~~.

Fig. 6 is a sectional view of an assembly of the expanded nozzle of the first preferred embodiment ~~of the present invention~~.

Fig. 7 is a perspective view of the appearance of the expanded nozzle of the first preferred embodiment ~~of the present invention~~.

Fig. 8 is a perspective view of the appearance of the narrow nozzle of the first preferred embodiment ~~of the present invention~~.

Fig. 9 is a sectional view of a release key of the first preferred embodiment ~~of the present invention~~.

Fig. 10 is a bottom view of the release key of the first preferred embodiment ~~of the present invention~~.

Fig. 11 is a bird's eye view of a local part of the first preferred embodiment ~~of the present invention~~.

Fig. 12 is a sectional view showing that the release key of the first preferred embodiment ~~of the present invention~~ is mounted to a holder.

Fig. 13 is a cross-sectional ~~cross~~ view of a local part showing the interaction ~~combination~~ by means of matching hooks ~~hookers~~ between a slider and a connector of the first preferred embodiment ~~of the present invention~~.

Fig. 14 is a schematic view showing that the release key and the slider of the first preferred embodiment ~~of the present invention~~ are hooked to each other.

Fig. 15 is a sectional view showing that the release key and the slider of the first preferred embodiment ~~of the present invention~~ are hooked to each other in a locked position.

Fig. 16 is a sectional view showing that the hook of the slider is

compressed by the release key of the first preferred embodiment in order to release the slider of the present invention is released.

Fig. 17 is a sectional view showing ~~the~~ these primary members of the dust receiver of the first preferred embodiment ~~of the present invention.~~

Fig. 18 is a schematic view showing that the primary nozzle of the first preferred embodiment ~~of the present invention~~ is released but not yet closed up.

Fig. 19 is a schematic view showing that the primary nozzle of the first embodiment ~~of the present invention~~ is released and closed up.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figs. 1, 2 and 3, ~~an a preferred~~ embodiment of ~~the present invention of a hand~~ a hand-held vacuum cleaner is essentially comprised of a cleaner 1, a primary nozzle 2 and one set or two sets of ~~expanded nozzle expandable nozzles~~ 3, 3a. Wherein, the cleaner 1 ~~related to a like the~~ prior art includes a dust receiver 11, a strainer 12, a fan 13, a motor 14, a power switch 15, a handle 16, and a battery set 17. In ~~a preferred~~ an embodiment of the present ~~invention hand-held vacuum cleaner,~~ an opening 18 is formed at the front end of the dust receiver 11 of the cleaner 1 to accommodate the combination of the primary nozzle 2 and both ~~expanded~~ expandable nozzles 3, 3a. Multiple retainers 181 (181a) and 182 (182a) are each respectively provided on both sides of the inner wall and the bottom of the opening ~~49~~ 18. A holder 111 is provided to the dust receiver 11 at the top of the opening 18. As illustrated in Fig. 4, a through hole 112 is ~~each~~ provided on both sides of the holder 111, a ~~retainer retainers~~ 113 ~~is each~~ are provided on both side walls of the ~~tray~~ holder 111, as shown in Figs. 15 and 16, and a through hole 114 is provided at the lower end of the holder 111.

The primary nozzle 2 ~~related to~~ includes a member with narrow nozzle

having at its terminal end connected to a flexible hose 21 and a positioning ~~grain~~
nub or stop 22 is provided on the wall at the top of the nozzle.

~~Both sets~~ Sets of the ~~expanded nozzle~~ expandable nozzles 3, 3a are provided on both sides, or one set of the ~~expanded~~ expandable nozzle 3 is provided on a selected side of the primary nozzle 2. Each ~~set of expanded~~ expandable nozzle 3, (3a) is comprised of a slider 31 (31a) and a connector 32 (32a) engaged to each other by sliding. A coil 33 (33a) is provided to each set of the ~~expanded~~ expandable nozzle 3, (3a) placed ~~at where~~ between where the slider 31 (31 a) and the connector 32 (32a) are moveably inserted in the ~~nozzle~~ opening 18 of the dust receiver 11. Both of the slider 31 (31 a) and the connector 32 (32a) are either expanded away from each other as illustrated in Figs. 5, 6 and 7 when the coil 33 (33a) is released, or retreated into each other as illustrated in Fig. 3 or Fig. 8 when the coil 33 (33a) is compressed.

The holder 111 provided on the upper wall at the front end of the dust receiver 11 contains a release key 19 as illustrated in Figs. 9, 10 and 11. A hook 191 is ~~each~~ provided on both outer walls of the release key 19. A first plunger 192 is ~~each~~ provided at a selected location to push and release the ~~expanded~~ expandable nozzle 3, (3a), and a second plunger 193 is provided to push and release the primary nozzle 2 [[3]]. A return coil 194 as illustrated in Fig. 12 is placed within ~~pre-planted into~~ the release key 19 for a fast return of the release key 19 ~~when after the~~ key has been compressed. Furthermore, as reinforcement to the structural strength of the first plunger 192, an additional rib 195 is connected to the first plunger 192 ~~at where~~ between the first plunger 192 and the inner wall of the release key 19.

The ~~expanded~~ expandable nozzle 3 (3a) is comprised of the slider 31 (31a) and a the connector 32 (32a) by means of two matching hooks ~~for~~ to allow both of the slider 31 (31a) and the connector 32 (32a) to retreat into each other, thus to make sure that they will not disengage from each other. As illustrated in Figs. 13 and 14,

two matching hook bits 311 (311a) and 321 (321a) (~~321b~~) respectively extending from the slider 31 (31a) and the connector 32 (32a) constitute relative retainers for both ~~of~~ the slider 31 (31a) and the connector 32 (32a) while another end of the hook bit 321 (321a) provided to the connector 32 (32a) is held by the retainer 181 (181a) from the inner wall of the opening 18 as illustrated in Fig. 6. Accordingly, when the ~~expanded~~ expandable nozzle 3 (3a) is stretched out, it functions as a limiting retainer as illustrated in Figs. 6 and 7 to prevent ~~both of the slider 31 (31a) and the connector 32 (32a) to disengage~~ from disengaging from each other. On the other hand, when the opening returns to a narrow nozzle, the hook bit 311 (311a) is used to block a sidewall 23 of the primary nozzle 2, as shown in Fig. 8, so that the primary nozzle 2 may not be extended.

As illustrated in Figs. 1 and 5, the slider 31 (31a) and the connector 32 (32a) are each respectively provided with the hook bit 312 (312a) and a matching groove 322 (322a) for the hook bit 312 (312a) to slide in the groove 322 (322a) and to function as a retainer positioning between the slider 31 (31a) and the connector 32 (32a) when the hook bit 312 (312a) slides to the extreme in the groove 322 (322a).

A recess 313 (313a) is provided at the bottom of the slider 31 (31a) to define a retaining ~~function~~ stop together with the retainer 182 (182a) provided on the bottom wall in the opening 18.

As illustrated in Fig. 15, the hook bit 312 (312a) provided to the slider 31 (31a) ~~merely defines a positioning function~~ provides a positioning and locking mechanism by ~~hooking up the retainer engaging with the retainers 113~~ each provided on both sidewalls of the ~~tray~~ holder 111. The first plunger 192 of the release key is ~~merely indicates a matching relation~~ configured to engage with the hook bit 312 (312a). Accordingly, once the release key 19 is compressed as illustrated in Fig. 16, the first plunger 192 pushes against the hook bit 312 (312a) of the slider 31 (31a) to release ~~externally~~ the connector 32 (32a) ~~by the load released~~ via the biasing force from the coil 33 (33a) to widen up the

expandable nozzle 3 (3a).

An inner sleeve 183 is extended from the inner wall of the opening 18 of the dust receiver as illustrated in Fig. 17 to accommodate the built-in flexible hose 21 connected to the primary nozzle 2. A limiting ring 211 is inserted ~~to~~ into the terminal end of the flexible hose 21, a gradation 184 is provided at the front end of the wall of the inner sleeve 183, and a retainer ring 185 is locked to the terminal end of the wall of the inner sleeve 183, so that ~~for~~ the limiting ring 211 ~~to~~ may respectively ~~function a limiting retainer~~ engage with the gradation 184 or the retainer ring 185 to prevent the flexible hose 21 from falling ~~off~~ out of the inner sleeve 183 when the flexible hose 21 advances ~~or retreats in~~ from or retracts into the inner sleeve 183.

The positioning ~~grain nub or stop~~ 22 provided on the wall at the top of the primary nozzle 2 is inserted into the through hole 114 provided at the lower end of the holder 111 and is held in position therein when the flexible hose 21 is compressed to be stored inside the inner sleeve 183. The ~~built-in~~ built-in flexible hose 21 is further secured inside the inner sleeve 183 ~~since~~ by the hook bit 311 (311a), which in the normal condition blocks out the sidewall 23 of the primary nozzle 2, as previously discussed, and as shown in Fig. 8.

The ~~expanded~~ expandable nozzle 3 (3a) has a coil 33 (33a) ~~placed~~ placed between the slider 31 (31a) and the connector 32 (32a). One end of the coil 33 (33a) is fixed to hold against an inner rod 115 or elsewhere as selected inside the dust receiver 11. ~~[[,]] and~~ The coil further penetrates through the connector 32 (32a) ~~for so that~~ the other end of the coil 33 (33a) ~~to hold~~ may be held or fixed against the slider 31 (31a), as shown in Fig. 6. Accordingly, once the release key 19 is compressed, the slider 31 (31a) is ejected to ~~push outwardly~~ pull the connector 32 (32a) outwardly to widen ~~up the primary nozzle 2~~ the extendable nozzle 3 (3a).

~~As the~~ The primary nozzle is released by the engagement between the second

plunger 192 and the positioning nub or stop 22 before the ~~expanded~~ expandable nozzle 3 (3a) has ~~not yet~~ fully expanded. However, the sidewall 23 of the primary nozzle 2 is still blocked ~~out~~ by the hook bit 311 (311 a), as previously described and as shown in Fig. 8. Therefore, the release key 10 has first to first go through a compression to widen ~~up~~ the ~~expanded~~ expandable nozzle 3 (3a) so as to be free from ~~the block-out being~~ blocked by the hook bit 311 (311a), as shown in Fig. 7. ~~then~~ Then after ~~the a~~ a second time of compressing the release key ~~for so~~ the second plunger 193 of the release key ~~10 to 19~~ may push against the positioning ~~grain~~ nub or stop 22 of the primary nozzle 2, ~~and finally~~ the primary nozzle 2 is finally automatically ejected together with the flexible hose 21. Meanwhile the ~~expanded~~ expandable nozzle 3 (3a) retreats to its original status to such extent allowing only the primary nozzle 2 and its built-in flexible hose 21 to be ejected for vacuum cleaning as illustrated in Fig. 19. Furthermore, the ~~built-in~~ built-in flexible hose 21 ~~permits itself to be~~ is easily compressed and hidden inside the inner sleeve 183. Once the flexible hose 21 is ejected, it extends to ~~become~~ a longer hose to facilitate cleaning areas where ~~prevent directly access for~~ the hand vacuum cleaner the hand-held vacuum cleaner is prevented direct access, such as ~~the a~~ a drawer, slit or groove.

Within the scope of the teaching of the present ~~invention~~ disclosure, the design of the structure allowing the width of the nozzle to be adjustable ~~alone is sufficient to~~ may be applied to a ~~hand~~ hand-held vacuum cleaner, without the additional structure of the extendable and retractable nozzle and hose. ~~by allowing wider nozzle to expand the reach of the hand vacuum cleaner.~~ Meanwhile Likewise, the improvement involving the storage of the built-in flexible hose that can be doubled in length as taught in the present ~~disclosure invention~~ can be individually applied to a hand-held vacuum cleaner, without the additional structure of the expandable nozzle permit a built-in hose that can be doubled with its length when in use and easily stored when not used to eliminate the necessity

~~of external accessories as observed with the prior art of the hand vacuum cleaner.~~
Both of the ~~expanded~~ expandable nozzle and the built-in hose are integrated into the present ~~invention~~ embodiment at the same time.

It is sufficient for members of the present ~~invention~~ embodiment including the slider 31 (31a), the connector 32 (32a) and the coil 33 (33a.) of the ~~expanded~~ expandable nozzle 3 (3a) to be provided means of retractable sliding ~~relatively matching~~ relative to one another. The connection structure of each matching hook bit certainly is not limited to the ~~preferred~~ embodiment as illustrated. Any other replacement or substitute with equivalent function may be used. Furthermore, it is not ~~necessarily~~ necessary to provide ~~each expanded an~~ expandable nozzle 3 (3a) on both sides of the primary nozzle 2. Instead, a single ~~expanded~~ expandable nozzle 3 or 3a may be provided on either side of the primary nozzle 2 to achieve the same purpose of widening ~~up~~ the nozzle.

Similarly, multiple connectors 32 (32a) may be connected in series by the same or equivalent hook bit for the slider 31 (31a) to ~~drive at one time or by section push all at once, or each in turn,~~ those multiple connectors 32 (32a) to outwardly expand to define a multi-sectional combination of the ~~expanded~~ expandable nozzle 3 (3a), thus to further widen ~~up~~ the nozzle. Therefore, the ~~preferred~~ embodiment given in the present ~~invention~~ disclosure is not to limit the technical scope of the present invention. Any ~~art involving~~ other equivalent replacement and/or substitute components or features should fall within the teaching of the present invention.

The present invention, by providing a ~~hand~~ hand-held vacuum cleaner with its nozzle width adjustable and a built-in flexible hose, is innovative, advanced and practical. ~~Therefore, this application is duly filed accordingly.~~

ABSTRACT

A ~~hand~~ hand-held vacuum cleaner allowing adjustment of its nozzle width and provided with a built-in hose; ~~one~~ either side or both sides of a primary nozzle ~~being~~ are provided with one set or two ~~sets of expanded nozzle expandable nozzles~~, each ~~expanded~~ expandable nozzle ~~being comprised of~~ including a slider and a connector inserted ~~to~~ within each other, the nozzle getting wider as both ~~of~~ the slider and the connector are outwardly stretched to enlarge the scope of the vacuum cleaning ~~scope~~ area, the flexible hose being compressed and stored in an inner sleeve in a dust receiver, and ejected to extend its length ~~in the~~ during use.